

**CLAIMS**

1. An apparatus for detecting presence of transient particulate in gas within a duct, said apparatus comprising at least one emitter of illumination selected from infra-red, ultraviolet and visible radiation capable of being projected over essentially the entire cross section of the duct and at least one detector for detecting any sparkle of the illumination from the particulate.
2. An apparatus as in claim 1 in which the emitter of illumination is a single emitter.
- 15 3 An apparatus as in either claim 1 or 2 in which the illumination has a wavelength in the range 460nm to 680nm.
4. An apparatus as in any one of claims 1 to 3 in which the emitter is a laser.
- 20 5. An apparatus as in claim 4 in which the illumination has a wavelength in the range 532nm to 680nm.
- 25 6. An apparatus as in any one of claims 1 to 5 in which the detector is a camera.
7. An apparatus as in any one of claims 1 to 5 in which the detector is at least one phototransistor.
- 30 8. An apparatus as in any one of claims 1 to 5 in which the detector is a video camera.

9. An apparatus as in any one of claims 1 to 8 in which the detectors are arranged around the illumination emitter.

5 10. An apparatus as in any one of claims 1 to 9 in which the illumination from the emitter is fanned.

11. An apparatus as in claimed in claim 10 in which the detector is fanned by a line generator.

10 12. An apparatus as in claimed in claim 10 in which the illumination is fanned by an optical lens.

13. An apparatus as in any one of claims 1 to 9 in which  
15 the illumination from the emitter is scanned.

14. An apparatus as in claim 13 in which the illumination from the emitter is scanned in the duct by a mirror,  
movement of which directs the illumination in the  
20 duct.

15. An apparatus as in any one of claims 1 to 14 in which the emitter illumination frequency is matched to a detector specific for that frequency.

25 16. An apparatus as in any one of claims 1 to 15 in which the emitter of illumination and the detector are located outside the duct wall, the duct wall being provided with transparent window so that illumination and sparkle are transmitted through the duct wall  
30 through transparent windows.

17. An apparatus for detecting particulate within a duct as claimed in any one of claims 1 to 16 which also comprises a duct, located on which is at least one emitter of illumination capable of being projected over a substantial cross section of the duct and at least one detector for detecting any sparkle of the illumination from the particulate.  
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18. An apparatus as claimed in claim 17 which is located in the duct at the inlet to an industrial process.  
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19. An apparatus as claimed in claim 17 which is located in the duct at the outlet from an industrial process.
- 15 20. An apparatus as claimed in claim 18 which the apparatus is located in the duct upstream of a turbine in the inlet to an industrial process having regard to the direction of the gas in the inlet.
- 20 21. An apparatus as claimed in claim 19 which the apparatus is located in the duct downstream of a turbine in the outlet from an industrial process having regard to the direction of the gas in the outlet.  
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22. A method for detecting presence in gas of transient particulate above its normal zero or acceptable level within a duct which comprises subjecting a duct with at least one emitter of illumination selected from infra-red, ultraviolet and visible radiation, projecting the illumination over a substantial cross section of the duct and detecting any sparkle of the illumination from the particulate.  
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23. A method as claimed in claim 23 which comprises projecting the radiation in the duct at a position after the gas has been through an abatement system.

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24. A method as claimed in either claim 23 or 24 which comprises detecting transient particulate in a duct at the inlet to an industrial process.

10 25. A method as claimed in either claim 23 or 24 which comprises detecting transient particulate in a duct at the outlet from an industrial process.

15 26. A method as claimed in claim 25 which comprises detecting transient particulate in a duct upstream of a turbine in the inlet to an industrial process having regard to the direction of the gas in the outlet.

20 27. A method as claimed in claim 26 which comprises detecting transient particulate in a duct downstream of a turbine in the outlet from an industrial process having regard to the direction of the gas in the outlet.

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28. A method as claimed in claim 27 in which the industrial process is an electricity generating station.

30 29. A method as claimed in Claim 24 in which the abatement system is in the inlet to an area requiring an essentially particulate free environment.

30. A method as claimed in claim 30 in which the essentially particulate free environment is in a hospital.